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Appln. No.: 09/832,209 Q64055

Amendment under 37 C.F.R. § 1.111

<u>REMARKS</u>

Claims 1-10 are pending in the application.

Claims 1-6 have been allowed.

Claims 9 and 10 have been rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite.

Specifically, the Examiner criticizes the following language in Claims 9 and 10: "glass powder having lower transition temperature having a glass transition temperature." He suggests that "having lower transition temperature" be deleted.

Applicants have deleted the phrase "having lower transition temperature." Applicants submit that the claims are clear and definite and respectfully request that the Examiner reconsider and withdraw the § 112 rejection.

The Examiner has objected to the specification for informalities. The Examiner asserts that the glass used in the instant invention is not defined by a composition and therefore does not provide one of ordinary skill in the art with sufficient information to reproduce the instant invention. The Examiner criticizes the specification on the basis that it refers to trade names for certain chemical materials, the composition of which may change over time. Therefore, the Examiner requests that Applicants supply product information sheets for the trade names and amend the specification to include the composition.

Applicants submit herewith data sheets showing the properties of ASF-1340. Applicants have also amended the specification to recite the chemical composition of ASF-1340 used in the examples. Applicants submit that the specification is clear and definite and fully enabled and

9

Appln. No.: 09/832,209

Amendment under 37 C.F.R. § 1.111

Q64055

therefore, Applicants respectfully request that the Examiner reconsider and withdraw the

rejection.

In view of the above, reconsideration and allowance of this application are now believed

to be in order, and such actions are hereby solicited. If any points remain in issue which the

Examiner feels may be best resolved through a personal or telephone interview, the Examiner is

kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue

Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any

overpayments to said Deposit Account.

Respectfully submitted,

Registration No. 54,257

SUGHRUE MION, PLLC

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WASHINGTON OFFICE

23373

CUSTOMER NUMBER

Date: July 26, 2004

10



ASF/ATG Powder Glass for Electronics POWDER GLASS

AP Dielectric Glass Pastes for Thick-film Printing GLASS PASTE

2004.April version

ASAHI GLASS CO., LTD. Electronic Materials & Products General Div. Shinyurakucho Bldg., 1-12-1 Yurakucho Chiyoda-Ku, Tokyo 100-8405 JAPAN Phone: +81-(0)3-3218-5433 Facsimile: +81-(0)3-3218-7861

Seal	
Hermetic	
ģ	
Glass	
Powder	
Ŗ	

Code Glass 1ype TempTime Expansion Coeff. Specific Specific Transformation Softening Orystallization or Volume Dielectric Dielectric Dielectric Dielectric Dielectric Dielectric Dielectric Dielectric Dielectric Contact Value) Sioving Size Contact Value Sioving Size Contact Value Size Contact	Firing Condition	8	Thermal		Viscosity Proper	Property (ty (DTA)		Electrical Property	ty.		Particle Property	4				_
t Point (°C) Temp. (°C) Resistance (°C) Constant (°C) Loss (°C) Perticle (°C) Gentar Value) (°C) Mash Pass (°C) Powder (°C) Powder (°C) After Firing) 715 (°C) 140 5 14 5 150°C — White — White 155 14 5 20 55 — 150°C — White 650 12 7 20 100 — 100 White 650 12 7 20 10 — 100 White 650 12 7 20 10 — 100 White 650 12 7 20 10 — 100 White 650 12 7 20 100 — 100 White 650 12 7 20 - - 100 White 650 12 7 20 - -	TempTime Expansio	Expansio	n Coeff.	Specific	Transformation	Softening	Crystallization	Volume	Dielectrio		Average	Particle Size		Granulated	Color	Lead	
t Point Temp. Log O (Ω · cm) E tan δ (X10 ⁻⁴) Size (D50) Mosh Pass Mosh Pass (After Firing) 715 160°C 1MHz, 25°C 1MHz, 25°C 1MHz, 25°C 1MHz, 25°C 1MHz, 25°C 1MHz 150 - White 715 14 5 20 5.5 - 150 - White 650 12 7 20 10.0 - 150 - White 650 12 7 20 10.0 - 100 White 650 12 7 20 10.0 - 100 Blue 650 12 7 20 10.0 - 100 Blue 650 12 7 20 10.0 - White 650 12 7 20 - - White 650 12 7 20 - - - White 650 12				_			_	Resistance	Constant	Loss	Particle (Center Value)	Sieving Size	Powder		Free or	_
(°C) (°C) 150°C 1MHz, 25°C (μm)	(X10	<u>×</u>		Gravity	Point	Point	Тепр.	log 0 (Q .cm)	w	tan & (X10-1)	Size	(D20)	Mesh Pass	Mesh Page	(After Firing)	Cont	_
715 14 5 20 5.5 — 150 — White 850 12 7 20 100 — 150 — White 850 12 7 20 — — 100 White 850 12 7 20 — — 100 Blue 850 12 7 20 — — 150 — White 850 12 7 20 — — 150 — White 890 12 7 20 — — — White	(°C - min) 25 ~	52~	3000		၌	္မ	ည	150°C	1MHz, 25°C	IMHz. 25°C	(m m)	(E					_
715 14 5 20 5.5 - 150 - Blue 650 12 7 20 10.0 - 150 - White 650 12 7 20 10.0 - 150 White 650 12 7 20 10.0 - 100 Blue 650 12 7 20 - - - White 680 12 7 20 - - 100 White	980-5		48	2.3	510	715		14	2	20	5.5		150		White	Free	т
92 2.6 440 650 12 7 20 100 - 150 - White 92 2.6 440 650 12 7 20 - - - 100 White 82 2.6 440 650 12 7 20 - - - 100 Blue 99 2.6 505 690 12 7 20 - - - 100 Blue 99 2.6 505 690 12 7 20 - - - White nn ferro-nickel alloys, Kovar, etc. 12 7 20 - - - 100 White	980~5		48	2.3	510	715		14	2	20	5.5	-	150	,	Blue	Fras	7
92 2.6 440 650 12 7 20 - - - 150 White 82 2.6 440 650 12 7 20 10.0 - 150 - Blue 99 2.6 505 690 12 7 20 - - - White 99 2.6 505 690 12 7 20 - - - White 90 1.2 7 20 - - - White	980–5		92	2.6	440	650		12	_	20	10.0		150	-	White	E L	Т
82 2.6 440 650 12 7 20 10.0 - 150 - Blue 82 2.6 440 650 12 7 20 - - 100 Blue 89 2.6 505 690 12 7 20 - 150 - White 99 2.6 505 690 12 7 20 - - 100 White on, ferro-nickel alloya, Kover, etc. rities.	980-5		92	2.6	440	650		12	4	20	,			18	White	E L	Т
82 2.6 505 650 12 7 2.0 150 Blue 819 2.6 505 690 12 7 2.0 10.0 - 150 - 150 - White non-ferro-nickel alloys, Kover, etc.	980-5		92	2.6	440	650		12	7	20	10.0		150	-	Blue	Fran	Т
89 2.6 505 690 12 7 20 10.0 - 150 - White 99 2.6 505 690 12 7 20 - - - 100 White on, ferro-nickel alloys, Kover, etc. 4 - <t< td=""><td>980-5</td><td></td><td>82</td><td>2.6</td><td>440</td><td>650</td><td></td><td>12</td><td>_</td><td>02</td><td>,</td><td>-</td><td></td><td>100</td><td>Blue</td><td>France</td><td>т-</td></t<>	980-5		82	2.6	440	650		12	_	02	,	-		100	Blue	France	т-
690 12 7 20 100 White	980-5		99	2.6	505	690		12	7	20	10.0		150		White	Free	1
	880-5		99	2.6	505	9		12	7	20				100	White	Fra	Т
n, farro-nickel alloye, Kovar, etc. ties.																	7
inties.	metallic materials, including in	luding in	on, ferro-nick	kel allovs. K.	over etc.												
	Crystalline glass powder has outstanding heat-resistance properties.	36 07006	rties.	•													
	Non-alkaline dass is also evallable for sealing Kovar.																
	Suitable as glass powder, granulated powder and tablets.	نے															
	Chandated organic binders provide superior burn-out property.	roperty.															

ASF Pow	ASF Powder Glass for Low Temperature Sealing	Temperature	Sealing												
		2004.April version	Thermal		Viscosit	Viscosity Property (DTA	(DTA)		Electrical Property	A		Particle Property	2		
Code	Glass Type	TempTime	TempTime Expansion Coeff. Specific Transformation Softening Crystallization	Specific	Transformation	Softening	Crystallization	Volume	Dielectric	Dielectric		Average Particle Size		Color	Lead
			_		-			Resistance	Constant	Loss		Particle (Center Value) Sieving Size	Sieving Size		Free or
			(X10-7/°C) Gravity	Gravity	Point	Point		log 0 (Q.cm)	w	E tan & (X10")		(D20)	Mesh Pass (After Firing)	(After Firing)	Contd
		(C-min)	25∼300℃		္စ	၌	္မွ	150°C	1MHz. 25°C	1MHz. 25°C	_	(m m)		•	
		450-5	73	5.8	320	380		10	4	20	1	10.3	55	Black	Control
ASF1200M	B2O3 - PbO	450-10	72	5.8	320	380		9	14	20	4.0	1	55	Rlack	Contd
ASF1295	B203 - Si02 - PbO	450-10	83	5.6	335	405			ı		6.2		150	White	Conto
ASF1302B	ASF1302B 8203-PbO-ZnO	440-35	93	5.9	320	400	515	-		-	5.8	,	9	Risck	Conta
ASF1307	B2O3-PbO-ZnO	440-35	66	6.5	320	400	510	10	23	100	6.0		100	Vellow	Conta
ASF1307F	ASF1307F B2O3 - PbO - ZnO	440-20	46	6.5	320	400	510	2	23	90	1.5	3.5	325	Vellow	Contra
ASF1310	ASF1310 (R ₂ O ₂ -SiO ₂ -PhO	520-20	24	7	345	450						-			

ASF Powder Glass for Mold

		Firing Condition	Thermal		Viscosity	/ Property (DTA)	Elec	trical Propert	_		Particle Propert	Α.		
Code	Glass Type	TempTime	Expansion Coeff.	Specific	Transformation	Softening	Crystallization	Volume	Dielectric	Dielectric	Average	Dielectric Dielectric Average Particle Size Col		Color	Lead
				_				Resistance	Constant	Constant Loss Particle (Co	Particle	(Center Value)	Sieving Size		Free or
			(X10-1/°C)	Gravity	Point	Point		log p (Q ·cm)	w	tan & (X10-4)	Size	(020)	Mesh Pass (After Firing)	(After Firing)	Contd
		("C-min)	25~300℃		ဉ	ဥ	<u></u>	150°C	1MHz. 25°C	1MHz. 25°C	(E 3)	Ê			ji D
ASF1400	B203-ZnO	690-5	48	3.9	545	640	ı	7		e S	7.3		190	White	Contd
ASF1405	B203-Zn0	690-5	48	3.8	550	650		14	80	8	4.5		200	White	Contd

Characteristics

A low-alkeli glass with excellent insulating properties and good sealing to silicon chips.

ASF Powder Glass for Passivation

Г		_		_	ı
	Lead	Free or	Contd.		Contd
	Color		(After Firing)	•	White
÷		Sieving Size	Mesh Pass (After Firing		325
Particle Proper	Particle Size	Particle (Center Value) Sieving Size	(D20)	(E 3)	
	Average	Particle	Size	(E H)	9.8
,	Dielectric	Loss	tan & (X10-4)	Hz. 25°C 1MHz. 25°C	'
ctrical Propert	Diefectric	Constant	w	Σ	,
Ele	Volume	Resistance	log p (Q·cm)	150°C	
DTA)	Crystallization		Тетр.	ဥ	
Property (Softening		Point	ဥ	650
Viscosity	Transformation		Point	္မွ	480
	Specific		Gravity	_	3.5
Thermal	Expansion Coeff.	•	(x10-/\c)	25∼300°C	47
Firing Condition	TempTime			("Cmin)	730-10
	Glass Type				SiOz-PbO
	နှီ ပိ				ASF1260

Characteristics

A low-skall glass with excellent insulating properties and good sealing to silicon chips.

ASF Powder Glass for Shadowmask Coating

г					Т
	Lead	Free or	Contd.		7
	Color		(After Firing)	3	1
£		Sieving Size	Mesh Pass	(E 7)	25
Particle Prope	Particle Size	Particle (Center Value) Sieving Size	(D20)	(E 3)	
	Average	Particle	Size	(m m)	,
ty	Dielectric	Loss	tan & (X10")	AHz, 25°C 1MHz, 25°C (μm)	400
sctrical Proper	Dielectric	Resistance Constant	w	1MHz, 25°C	Φ
Ek	Volume	Resistance	log 0 (Q · cm)	150°C	13.5
(DTA)	Crystallization		Temp.	ဥ	
/ Property	Softening		Point	္စ	400
Viscosit	Transformation		Point	္စ	320
	Specific		Gravity		8.5
Thermal	Expansion Coeff.		(X10-7/C)	25~300°C	08
Firing Condition	TempTime			(°C − min)	440-35
	Glass Type				B203-ZnO-Pb0
	ခို လိ				ASF2002

ASPENNYZ 181017-2010-PDU | 940-53 | 80 | 0.5 | 540 | 900 |
Characteristics

With a conductive filler additive, this fift makes it possible to control the static electrical characteristics of coated substances.

_
Contd.)
(Lead
Binder
for
Glass
Powder
ASF

_	_					_	_	_	_	_	1	_		_		_	_	_	,			_		_	_	_
	Lead	Free or	Contd		Contd	Conta	Dieta C	Contd	Contra	Contd	Contd	Ponto		Contract	Conta	ooue.	Conto.	Conta.	Conta	Conta	Conta	Contract	Conta	Soute	Conta.	Contd.
	Color		Mesh Pass (After Firing)	,	Vellow-white	Vellow-white	Dale vellow	Pale vellow	Yellow	Yellow	Grav	White	2	White	White	White	White	Vellow-green	White	Data vallow	White	White	Marito	MILLE	Waite	white
_		Sieving Size	Mesh Pass		325	325	305	325	325	325	325	375	150	325	325	205	200	250	325	325	325	395	302	25	38	323
Particle Property	Particle Size	(Center Value) Sieving Size	(020)	(m m)	8	20					3.9	12	-	22	2.4	- 2	20.3	10.7	2.9	6	,	,		3		
	Verage	article	Size	(m m)	,	,	20	- 22	25.	4.5	2.0	2.0	40	2.1	20	20	7.0	8	23	1.7	8	8	3.6	4 8		2
<u></u>	Dielectric	Loss	tan & (X104)	1MHz, 25°C	,				-	,	21	18	20	9	,		-	,	2				9			
Electrical Property	Dielectrio	Constant	س	IMHz, 25°	-				-	1	14	13	20			,	 -	1	F				=	,		
Eleo	Volume	Resistance	log p (Q · cm)	150°C		1		,			13	14	2	14	•		-		14	•			14	,		1
(DTA)	sformation Softening Crystallization		Temp.					290					515					685	805	705			540		576	-
Viscosity Property (DTA	Softening		Point	<u>ြ</u> ့	575	595	900	535	390	400	445	505	420	615	550	695	700	625		-	685	07.7	515	980	750	
Viscosit	Transformation		Point	(,C)	475	470	460	430	340	335	380	420	345	465		555	555	530	069	910	555	615	450	530	575	
	Specific		Gravity		4.3	4.1	4.5	5.1	6.2	6.4	5.6	5.2	6.2	3.8	4.1	3.8	3.5	3.9	3.0	3.9	3.5	3.1	4.8	3.6	3.6	
Thermal	Expansion Coeff. Specific Tran		(XIO./C)	25~300℃	64	55	73	62	107	106	92	- 77	79	54	83	62	90	39	90	63	55	52	47	29	20	
_	TempTime			(C-min)	600-10	600-10	650-15	600-15	440-10	440-10	200-15	550-10	520-10	650-15	700-15	810-5	800-10	720-10	850-15	800-15	720-15	850-10	550-15	750-10	850-10	
· ·	Glass Type				SiO2+PbO+B2O3	SiO2-PbO-B2O3	SiOz · PbO	SiOz-BzO3-PbO	SiOz-BzO3-PbO	SiO2-B2O3-PbO	B ₂ O ₃ ·P _b O	SiOz - BzOz - PbO	BzO3 - PbO	SiOz-BzO3-PbO	Sioz-Pbo	SiO2.PbO	SiO2-B203-Pb0	BzO3 · ZnO	SiO2-Al2O3-RO	SiO2-Al2O3-RO	SiOz-ZnO-PbO	SiOz-PbO-RO	8203-ZnO-PbO	SiO2+B2O3+PbO	SiOz-BzOj-PbO	
	စို			T					او			1		П	ASF1373				ASF1500	٦	Ī				ASF1592	

ASF Powder Glass for Binder (Lead Free.)

Firing Condition		Firing Condition	Thermal		Viscosity	Viscosity Property ((DTA)	Elec	Electrical Property	,		Dartirle Bronesty			
ဗို	Glass Type	TempTime	Expansion Coeff Specific Transformation Softening Crystallization	Specific	Transformation	Coffening	invetallization.	Volume	1			200			
				2		9	n yacametalon	P	Dielectric	Dielectric		Particle Size		5000	Lead
	-		(40, 1-0,1)					Kesistance	Constant	Loss		(Center Value)	Sieving Size		Free or
		(C - min)	(X10 / C) 25~300°C	Gravity	Point Coint	Soint Coint	Temp.	log p (Q cm)	1MH- 25°C	tan & (X104)	Size	(020)	Mesh Pass	(After Firing)	Contd.
ASF1100	B2O3-Bi2O3	460-30	=	2	380	440	Ī	,	202	, milk, 20 C) 	, H III)	95,		
ASF1100B	B2O3 · Bi2O3	460-30	107	6.3	380		520					7.0	200	Drown Vellow	ree
ASF1109	B2O3-ZnO-Bi2O3	580-5	£		ABO	979					1	-	323	Yellow	Free
ASF1131	R*O**7nO*RisO*	2-009	300	•	700	040		•	'	-	-	2.8	325	Green	Free
ACETADE	2027 2010	2000	8		2	900		,	'	-	'	3.3	325	Yellow	Free
1	D03.700	21-000	8		503	595	845	'	1	-	1.8	2.2	325	White	Free
ASF 1360	SiO2-2no-RO	850-15	23	33	870	2	810	1	'	-	1.7	1.8	325	White	Free
-	01.01.20is	820-10	22	3.4	645	753	900	•	-	ı	1	3.9	325	White	Free
ASF 1 /00	SIO2-ZUO-RO	850-15	72	3.7	655	802	882	14	6	20	1.6	1.6	325	White	Free
	SIO2-AI2O3-RO	950-15	80	<u>=</u>	720	880	915	14	6	20	1.1	1.5	325	White	Free
Ī	Si02 · ZrO3 · R20	1050-15	65	2.7	670	805			,	,	0.9	14.9	100	White	Fran
T	SiOz BzOs RO	850-15	52	2.5	535	780		-	-	1	9,0	3.8	325	Grav	Free
	SiO2-ZnO-RO	09-006	61	3.3	640	795		1	ı	-	1.8		325	White	Fran
П	Si02-B203-Zn0	600-10	99	3.5	490	280	715	•		1		3.0	325	White	Free
		810-10	3	3.5	485	28	069	-	-	1	,	1.5	325	White	Fige
2		01-008	29	7	460	260	900	-	'	-		4.0	325	White	Free
AST 1895	SiO2+B2O3+R2O	600-10	88	3.6	480	570		-	-	-	-	1.5	325	Brown	Free
- 1	SiO2-6203-120	01-009	B :	34	440	525			-		-	4.5	200	White	Free
ы	SIU2-6203-R20	01-009	90	4	438	525	ı	-	-	-	-	=	200	Brown	Free
	SiOz-BzOj-RO	850-15	87	3.7	620	720		,	-	r	•	2.0	325	White	Free
ASF 1941	SiO2-B2O3-RO	21-00/	06 (8	2	290	88		,	•		1	3.5	100	White	Free
Т	00.503.203.203.203.203.203.203.203.203.203.2	CI-00/	3	2	282	673	ı	1		1	•	1.2	325	White	Free
	202 - 203 - 203	01-000	401	97,0	440	280		-	'	•	-	4.0	100	Gray	Free
10	SIOZ BZO3 RZO	01-000	45	7.8	450	270		,	-	-	-	1.4	325	Brown	Free
L MILE	oducts									İ					
	B2O3.ZnO.BizO3	600-10	54	5.5	440	520	550	1			-	3.0	100	Yellow	Free
- 1	B203 ZnO BizO3	600-10	43	4.7	480		270	,	,			3,5	100	Yellow	Fras
1620M	Si02-B203-Zn0	850-15	20	37	280	657	810	-	1	1	1	25.0	150	White	Free
	SiO2 - B2O3 - R2O	600-10	160	2.8	395	202			-	,	-	6.0	150	White	Free
	SIUZ-KO	1000-30	4/	30	730	880		-	ı	•	ı	8.0	<u>8</u>	White	Free
CISSIM	SIOZZENOTRO	850-10	109	3.8	670	8	910	'	-		-	2.5	325	White	Free

Characteristics with the control of
ASF Powder Glass for Glass-Ceramic Multilayer Substrate

		_	_	_	~	-		-	_		_	-	_	-	_	_	
		Free or				9911	991	4		201	Fran	-	001	Free	Free	Free	
	Average Particle Size Color Thermal	Conductivity	(X10 dal/cm.sec. C)					•			•		cc	7.7	,	1	
	Color		(After Firing)		100	White	111110	Clear	100	Olean	Clear	100	1000	Class	Clear	White	
t)		Sieving Size	Mesh Pass		325	205	24.0								•		
Particle Property	Particle Size	(Center Value)	(020)	(E 3)	a.	3.6	۷.,2	3.5	7.3	?	2	ď	9.0	2.5	2.0	5.0	
	Average	Particle	Size	(m m)	30	,		ı	,		1	,			'	,	
	Dielectric	Loss	tan & (X10-4)	1MHz, 25°C 1MHz, 25°C		α	,				ı		-		1		
Electrical Property	Dielectric	Constant	W	1MHz, 25°C	-	P		4	,		,		L.	•	'	,	
Ele	Volume	Resistance	log p (Q.cm)	150°C	•			7			ı	•	14			•	
rty (DTA)	ing Crystallization		Temp.											000 000	200,890		
Viscosity Property	Softening		Point	(၃)	780	930		8	775		760	755	785	000	3		
Viscosit	Transformation		Point	(၁)	535	635		495	495*1	10000	200	512*1	550				
	Specific	_	Gravity		2.5	2.2	[2.2	2.2	[7.7	2.2	2.2	2.6		7.7	
Thermal	TempTime Expansion Coeff. Specific Transformation Soften	7	(X10-/\C)	25~300°C	25	32		87	28		77	23	37		,	2	
Firing Condition	TempTime			(C-min)	900-00	900-10	2000	200-20	850-10	0,000	850-10	850-10	09-006	900-60	200	<u>'</u>	
-	Glass Type				Si0z-8203-RO	SiOz-B2O3-RO	0.0.0	SIU2 182U3 1 K2U	SiOz · BzOz · RzO	0.0	SIOZ-15/03-1/20	SiO2-B2O3-R2O	SiO2-B2O3-R2O	SiO3. Atj.O3. Man	2014 -015	ASPUSSOC SIOZ-AIZO3-MEO	
	§				ASF1780	ASF1781	A C.T. 4001.1	ASP IUZM	ASF102Y	ACCTOOK	ı	ASF102W	ASF1880	ASEO325V	01000	ASPUSSOC	

Characteristics

• These are the low delectric constant borosilicate glass suitable for the thermal expansion coefficient of silicon chips.

• AF0325V and AFF0325V are conflicted.

• AF0325V and AFF0325V are conflicted to the grain-size distribution for green sheeting.

• Powder glass with controlled water content and grain-size distribution for green sheeting.

• We can supply other grades and specifications of glass (grain diam, etc.) on both a prototype and a mass-production basis.

• Can be blanded with alumina, conflictit and other ceramic powders.

ASF Powder Glass for Alumina Substrate Glazin

		Lead	Free or	Cont			100	
		Thermal	Conductivity	Mesh Pass (After Fining) (X10 3cal/cm-sec. 2C)	(a) and (iii)	0.0	6.0	-
		Color		(After Firing)	3	3	Clear	77.70
	£\$		Sieving Size	Mesh Pass		205	04.0	306
	Particle Property	Average Particle Size	Particle (Center Value) Sieving Size	(D20)		, 2	7.0	-
		Average	Particle	Size				-
	ź.	Dielectric	Loss	tan & (X10-1)	150°C 1MH, 25°C 1MH, 25°C	2		1
	ctrical Proper	Dielectric	Constant	د ب	1MH, 25°C	,		
	Ele	Volume	Resistance Constant	log 0 (Q ·cm)	150°C			
	DTA)	oftening Crystallization		Temp.	္မ			_
	Ю.	Softening		Point	ည်	870		- 57.8
	Viscosity	Transformation		Point	၌	710	107	607
		Specific		Gravity		3.0	3	7.7
Glazing	Thermal	empTime Expansion Coeff. Specific		(X10-/^C)	25~300°C	69		2
ina Substrate	Firing Condition	TempTime			(C-min)	1250-60	00 000+	20000
ASE FOWGER GIASS FOR AIUMINA SUDSTRATE GIAZIN		Glass Type		_		SiOz-B2O3-RO	00.000	22.702
AST FOW		ဗိုလ			i	ASF1761	4001700	301-100

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sealing	
9	
CRT, VFD.	
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Glass	
3 Powder	
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		ype of Glass	252		,		perature and dine				Characteristics of Glass	itios of Ca	88				_	
နှစ် ပ	Glass				Ι	Sealing		Thormal	Thermal Expansion		-	Ž	olume Die	Volume Diefectric Young's Bending	ra's Bend		Lead	
	Characteristics	Composition	Solor	Shape	Temp.	Ę	Major application			Transition	Transition Softaning Density Resistance Constant Modulus Strength	ensity Res	istance Co	nstant Mod	Ilus Stren	ch	_	Other
					į			X10-7/°C	X10-7/°C Range (°C) Point	Point	Point		T 10R	log 10R				
					Q Q	(nin)				ဥ	ည	at	250°C R.1	:IMHz G		MPa Mesh Pass	98	
IWF-DT430	Vitreous	PbO-B203	Black	Powder, Pre-formed	430	10	VFD·PDP	72	30-300	310	353*1	7.2	9.6	35.0 57		8		Contd. Soda-Lime Glass Sealing
IWF-DT430-150	Vitreous	PbO-B2O3	Black	Black Powder, Pre-formed	430	10	VFD·PDP	72	30-300	310	353*1	7.2	9.6	ŀ	ŀ	150	Cont	Contd Soda-lime Gless Seeling
IWF-T029	Vitreous	PbO-B203	White	Powder, Pre-formed	450	15	VFD	78	30-300	316	H	09	9.2	-	ŀ	_	3	200
WF-7590B	devitrifying	PbO-B2O3-ZnO	Black	Black Powder, Pre-formed	64	35	CRT	88	30-300	320	╁	-	┝	L	ł	-	1	
IWF-7575BF	devitrifying	PbO-B203-ZnO	Black	Black Powder.Pre-formed	450	\$	VED	88	30-300	320	H	H	-	1	ł	ļ		
IWF-T759	devitrifying	PbO-B203-ZnO	Black	Black Powder, Pre-formed	8	30	VFD	82	30-300	310	╁	ł	t	+	+	3 5		
IWF-2300M	Vitreous	PbO-B2O3	Black	Powder, Pre-formed	63	0	PDP	67	30-250	307	╀		8.6	35.0 57	-	3 5	2	Contd DOOD Seeling
MFP2005	Vitreous	PbO-B203	Black	Powder	679	2	PDP	67	30-250	347	H	F	H	-	+	150	2	Build 0027
MFP2014	Vitreous	PbO-B2O3	Black	Powder	480	9	dOd	88	30-250	341	433*	8.8		-	_	150	1	

ATG Powder Glass for Ceramic sealing, Additives fo Ceramic substrates

ဗီ	98410	See of Cides	80			SEBILITY COMPOSITION	THE PERSON NAMED IN COLUMN 1													
900											Charact	Unaracteristics of Gass	Gass							
		:			Sealing	Sealing	-	Тъвтпа	Thermal Expansion				Volume	Dielectrio	Young's	Bending	Sieving	Lead		
<u>5</u>	Characteristics	Composition	200	Shape	- Gwb	Tine	Major application	,		Transition	Softening	Density	Resistance	Constant	Modulus Strength	Strength	Size	Free or	Other	
					Ş	(iii)		x10-7/°C	Range (°C)	Point	Point 3		log 10R	DT WALL	ģ			Contd.		
WF-T187M	Vitreous	2004.April version	Black	Powder.Pre-formed	S.	9	IC package	58	30-300	٩	3.55	28	2 4 6	128	5	+	150	3	Alteriac Configur	I
WF-CT410	Vitreous	PbO-B201	Black	Powder Pra-formed	410	10	Berkeen Ol	9	20-200	208	237	200	200	26	8	5 6	3		Sulles Sealing	T
WF-7583BF	devitrifying	PbO-B2O3-ZnO	Black	Powder Pre-formed	200		Consider Of	78	20-20	105	170	3	200	100	3 5	8 2	130		Aiumina Sealing	
WF-T072	Vitreous	PbO-8203-SiO2	White	Powder Pre-formed	575	L.	Insulation Over costing	å	30-400	740	1010	;	3	9	7	3 5	2	j :		
WF-T077	Vitreous	PbO-B203-Al203	White	Powder.Pre-formed	230	2	Insulation Over coating	72	30-30	411	475	3 6	3 5	3,50	*	86	38	Courte.		
WF-7578W	devitrifying	PbO-BzO3-ZnO	White	Powder, Pre-formed	520	8	Insulation. Over coating	78	30-300	385	440	5 6	120	183	2	3 8	3 5	j		
WF-7574	devitrifying	ZnO-8203-SiO2	White	Powder, Pre-formed	750	8	AIN Sealing	37	30-500	560	940		13.7	2 -	3 2	2	8	i control		T
K807	Vitreous	SiOz-BaO-BzO3	White	Powder			Ceramic co-firing	11	30-300	638	725*1	3.6		-		†	8	2		ľ
K808	Vitreous	SiOz-BaO-BzO3	White	Powder			Ceramio co-firing	69	30-300	630	725	3.4		69		+	8	1		
	devitrifying	SiO2-BaO-Al2O3	White	Powder			Ceramic co-firing	83	30-300	069	780	3.8		9.7			300	7	Devitrifying Tem - 870°C	ړ
	devitrifying	SiOz-BaO-Li2O	White	Powder			Dielectiro	901	30-300	476	553	2				T	300	7	Deviltifying Temp 775°C	200
	Vitreous	SiOz-BzOz-AlzOz	White	Powder			LTCC	25	30-300	520	750*1	22	10.0	4.3			300	Т		,
	devitrifying	SiO2-MgO-Al2O3	White	Powder			LTCC	52	30-300	720	820.1	2.6		90			[_	Devitribing Temn . 10	10000
724	Vitreous	SiO2-BaO-Al2O3	White	Powder			Insulation, Over coating	44	0300	726	924*1	2.6		8.8			300	i i	Strain Doint - 8749C	,
GSP523	Vitreous	Pb0 - B203 - Zn0	White	Powder	280	30	Paste	98	50-300	370	448*	5.4				 -	300	7	Deformation Doint - 41	٦
GSP553	Vitreous	PbO-B ₂ O ₃	White	Powder	800	70	Condenser paste	24	9230	550	703-7	2.5				\mid	300	7	Deformation Point 630°C	ျှင်
SK-231	Vitreous	BizO3-BzO3	White	Powder, Pre-formed	575	20	Paste	84	30-300	485	560*1	5.1	11.7	17.0	82		300	Т		
SK-360	Vitreous		White	Powder, Pre-formed	280	30	Paste	67	30-300	465	549.1	2.8	8.1	90	68		901	Free		
	Vitreous	1	Pale brown		490	10	Paste	137	25-300	280		3.8				-	100	Free		
1	devitrifying	Sn0-Zn0-P20s	Black	Powder	490	2	Paste	82	50-250	350		3.9					100	Free		ľ
	devitrifying	SiO2+B2O3+BaO	White	Powder			Dielectiro	88	30-300	556	.969	2.9	-				300	Free	Devitrifying Temp. : 790°C	ပ္စ
	devitrifying	Si02-B203-BB0	White	Powder			Diefectire	135	30-300	370	400	3.1	_				300	_	Devitrifying Temp. : 690°C	ပူ
	devitrifying	SiOz-BzO3-BaO	White	Powder			Diefectire	112	30-300	440	479	2.8					300	_	Devitrifving Temp. : 610°C	ပ္စ
1	devitritying	BzO3-BaO-ZnO	White	Powder			LTCC	80	30-300	200	580	4.0					300	Froe	Devitrifying Temp. : 620°C	ပ္စ
	devitribing	B2O3.ZnO	White	Powder			LTCC	£3	30-300	529	603	3.6					100	_	Devitrifying Temp. : 854	854°C
	devitrifying	SiOz-BaO-TiO2	White	Powder			Dielectiro	93	30-300	693	757,	4.1					300	_	٠.	ဥ
	devitritying	B2O3+MgO-TIO2	White	Powder			Dielectire	8	30-300	808	712"	2.3		į	-		300	_	Devitrifying Temp. : 73.	733°C
	Vitreous	SiOz · AlzO3 · RO	White	Powder			Peste	4	30-300	760	900	2.6					200	Free	1	
	devitritying	SiOz-B203-BaO	White	Powder			Dielectiro	121	30-300	400	450	2.9	9.6				ı	Free	Devitrifying Temp. : 590	5900
1	devicting	SiO2 AI203 RO	White	Powder	8	99	LTCC	112	30-300	690	780*1	3.3					300		Devitrifying Temp. : 900°C	ပ္စ
FF203 devications	devitritying	SIO2: AIZO1: RO	White	Powder	900	e 8	LTCC	100	30-300	700	775*	3.4				-	300		Devitrifying Temp. : 890	2008

Code Glass Composition Color IWF-7570 Vitreous PbO-B203-AkD3 White IWF-7214 Vitreous PbO-B203-AkD3 White IWF-7214 Vitreous PbO-S102 White IWF-7215 Vitreous PbO-S102 Black KE7129 Vitreous PbO-S102 Black KF130 Vitreous PbO-B303-S102 Black AFF103 Vitreous PbO-B203-S102 Black White PbO-B303-S102 Black	Shape Powder, Pre-formed Powder, Pre-formed Powder, Pre-formed Powder, Pre-formed	Sealing S Temp. (°C) 500 500	Soaling Time					Characteristics of Glass	cs of Glass					_	
Characteristics Composition Color	Shape Powder, Pre-formed Powder, Pre-formed Powder, Pre-formed Powder, Pre-formed		Time		Thermal Expansion				Volum	Volume Dielectric Young's Bending	S Young's	Bending	Sieving	Lead	
Vitreous PbO-B103-AirO3 White Vitreous PbO-B103-AirO3 White Vitreous PbO-B103 White Vitreous PbO-B103-B104 Black Vitreous PbO-S102 Black Vitreous PbO-B203-S102 Black Vitreous PbO-B203-S102 Black Vitreous PbO-B203-S103 White	Powder, Pre-formed Powder, Pre-formed Powder, Pre-formed Powder, Pre-formed			Major application			ransition	oftening Den	sity Resistar	ce Constan	Modulus	Strength		Free or	Other
Vitreous PhO-BiO3-AitO3 White Vitreous PhO-8i03-Minh White Vitreous PhO-8i02 White Vitreous PhO-8i02 Black Vitreous PhO-9i02 Black Vitreous PhO-9i03 Black Vitreous PhO-9i03 Black Vitreous PhO-8i03 White	Powder, Pre-formed Powder, Pre-formed Powder, Pre-formed Powder, Pre-formed	+			X10"/"C Range ("C)	Range (°C)	Point	Point Point log 10R	log 10	~		,		Contd	
Vitreous PbO-BiO2-AirO3 White Vitreous PbO-SiO2 White Vitreous PbO-SiO2 White Vitreous PbO-SiO2 Black Vitreous PbO-SiO2 Black Vitreous PbO-SiO2 Black Vitreous PbO-BiO2-SiO2 Black Vitreous PbO-BiO2-SiO2 Black Vitreous PbO-BiO3-SiO2 Black	Powder, Pre-formed Powder, Pre-formed Powder, Pre-formed Powder, Pre-formed	200	(min)				(°C)	(ဍ)	at250	R.T.IMH	e Gb a	MPa	Mosh Pass		
Vitreous PbO-5i02 White Vitreous PbO-8i03 White Vitreous PbO-8i03 Black Vitreous PbO-8i02 Black Vitreous PbO-8i02 Black Vitreous PbO-8i03 White	Powder, Pre-formed Powder, Pre-formed Powder, Pre-formed	200	2	Seathed heaters	84	30-300	378	440* 5.4	10.6	15.6	44	42	92	Contd	
Virceus Pb0-8203 White Virceus Pb0-502 Black Virceus Pb0-502 Black Virceus Pb0-802-502 Black Virceus Pb0-8203 White	Powder, Pre-formed Powder, Pre-formed		5	Seathed heaters	125	30-300	356	435" 4.7	7 10.4	15.6	43	4	901	Conta	
Vitreous PbO-SiO2 Black Vitreous PbO-BiO3 Black Vitreous PbO-BiO3 Black Vitreous PbO-BiO3 White	Powder, Pre-formed	425	2	Seathed heaters	9	30-300	316	365* 8.4	8.8	222	39	35	100	Contd	
Vitreous PbO·SiO2 Black Vitreous PbO·B203·SiO2 Black Vitreous PbO·B203 White		900	2	Ferrites Sealing	88	30-300	430	555" 4.4	-				100	Contd	Contd Deformation Point
Vitreous PbO-8203-SiO2 Black Vitreous PbO-8203 White	Powder, Pre-formed	560	01	Ferrites Sessing	ē	30-300	376	465* 5.5					9	Contd	Contd Deformation Point
Vitreous PbO+B2O3 White	Powder, Pre-formed	520	01	Ferrites Sesling	6	30-300	348	418*1 6.2					002	Conta	Contd Deformation Point
	Powder, Pre-formed	400	9	Stainless Steel Sealing	118	30-280	295	L					9	Contd	Contd Deformation Point
IWF-T436 Vitreous PbO·BzO3 Black	Powder, Pre-formed	450	5	Kovar Sealing	09	30-300	308	L	9.8	40.0	63	22	150	Conta	
Vitreous	Powder, Pre-formed	1000	9	Kovar Sealing	47	0-300	510	729* 2.3	-				8	90.	
K9104 Vitreous SiO2-B2O3-Na2O White	Powder	1000	10	Kovar Sealing	54	0-300	490	715*2 2.2		_	54	55	100	Free	Free Strain Point : 460°C
C Vitreous PbO-B2O3 White	Powder, Pre-formed	450	10	Seathed heaters	113	50-250	310	355* 6.5	8.0					Contd	Contd. Deformation Point
	Powder	520	ಜ	Ferrites Seeling	8	50-250	340	397*1 6.2					1	Contd.	Contd. Deformation Point :
GSP535 Vitreous PbO·BzO3·SiOz White	Powder			Ferrites Sealing	82	50-300	410	468** 6.0	_			-	1	Contd.	Contd. Deformation Point
GSP507 Vitreous PbO-B203 White	Powder	450	₽	Carbon Brush	112	50-250	310	354*1 6.6					300	Contd	Contd. Deformation Point :

ATG " Lead Free " Powder Glass for Low Temperature sealing

		Other					ŧ		
	Peol	Free or	Contd	_	Free	Free	Free	Froe	
		Size		at250°C R.T.1MHz GPa MPa Mesh Pass	120	150	120	150	
ľ	Bending	Strength	,	MPa				,	
	Young's	Modulus		gP _s			•		
	Dielectric	Constant		R.T.1MHz	,	,			
Glass	Volume	Transition Softening Density Resistance Constant Modulus Strength	log 10R	1250°C		,	,		
Characteristics of Glass		Density			3.4	3.4	1.4	3.8	
Charac		Softening	Point	၌	355*2	345,5	308	336* 3.8	
		Transition	Point	၌	182	280	284	280	
	Thermal Expansion		Range (C)		30-250	30-250	30-250 284	122 30-250 280	
	Thermal E		X10-7/°C Range (°C) Point		64 30-250	18	140	122	
Sealing temperature and time		Major application			Ceramio (Alumina) Sealing	Soda-Lime Glass Sealing			
ealing tem	Sealing	ᄩ		(min)	01	2	10	10	
S	Sealing	Temp.		(၁)	480	480	400	480	
		Shape			Powder	Powder	Powder	Powder	
358		Color			Gray	Gray	White	White	
Type of Giz		Composition			SnO-P2Os	SnO-P ₂ O ₅	SnO-P20s	SnO-P20s	The second secon
	Glass	Characteristics			Vitreous	Vitreous	Vitreous	Vitreous	
	Code				FP-74°	FP-67"	KF9531"	KF9079*	

*1 Licensed product of U.S. Petent No.2281580. Could not be used for some application. Please contact us for further infomation.

AP Over	coat Glass Past	AP Overcoat Glass Paste for Hybrid IC																	
•	1		ı				Thermal	Viscosity	ty Property	(DTA)	Color		Elec	Electrical Property	erty	-	Particle Property	erty	
ခို လ	Glass Type	Paste and Fired	Glass	Paste Paste	Paste	Firing	Expansion	Transfor-	Softening Crystal-	Crystal			Insufation Bi	Breakdown	\vdash	Average	-	Particle Size Sieving Size	Lead
		Glass Feature	Characteristics Viscosity Specific	Viscosity	Specific	Condition	Coeff.	mation		lization	Paste	Fired	esistance	Voltage	2	tan & Partic	Particle (Center Value) Mash Pass	Mesh Pass	Free or
				(Pa.s)	(Pa·s) Gravity	("C-min.)	(X10-7/°C)	Point (°C)	္မွ	Temp.(°C)	_	Glass (Q)	(a)	3	_	(%) Size(um)	m) (D50)(um)		Cont
AP5346	SiOz-BzO3-PbO	SiOz-BzOz-PbO Excellent waterproofing	Vitreous	170	2.4	510-5	72	400	485		Green	Green	>10 ₁₀	200	8~12 <05		-	325	Contd
AP5346B	SiO2-B2O3-PbO	SiO2-B2O3-PbO Excellent waterproofing	Vitreous	165	2.4	510-5	72	400	485		Black	Rlack) 10 to	1	8~12 <05	0.5		366	Confe
	0.0	Excellent waterproofing										+	╁		+	1		220	Contro.
AP3240G	SIO2-8203-PBO	SiO2: 8203: PbO For solder dams	Vitreous	900	77	510-5	72	400	485		Green	Green	°01^	>500 8~12 <0.5	1~12 <	(0.5 1.2	ı	325	Contd.
AP5346W	SiO2-B2O3-PbO	SiO2-B2O3-PbO Excellent waterproofing	Vitreous	120	2.4	510-5	72	400	485		White	White	>101	>500	8~12 <05	0.5	,	325	Long
AP5550	B203-ZnO-Pb0	B2O3+ZnO+PbO High mechanical strength	Crystalline	150	2.8	550-5	47	455		540	White	White	, 10 °	╈	7~12	<05 25	ŀ	325	Conta
AP5551	B201-ZnO-Pb0	B2O3-ZnO-PbO High mechanical strength	Crystalline	150	2.8	550-5	47	455		540	Green	t	>101	╆	~12 <			325	Contd

	;						Thermal	Viscosi	Viscosity Property (DTA)	(DTA)	Color		T	Electrical Property	perty	L	Particle Property	Property	
ego Code	Glass Type	Paste and Fired	Glass	Paste Paste	Paste	Firing	Expansion	Transfor	S	Crystal			Insulation Breakdown	Breakdown		Ave	Average Particle	Particle Size Seving Size	
		Glass Feature	Characteristics Viscosity Specific	Viscosity	Specific	Condition	Coeff.			lization	Paste	÷	Resistance Voltage	Voltage		an & Par	Particle (Center Value)	/ahra) Mark Pass	
- 1				(Pa·s) Gravity	Gravity	(°C-min.)	(X10-7/C)	Point (°C)		Temp.(°C)		Glass	8	3		(96) Size(um)	(DSO) (mm)	Œ	Conta
	SiOz-BzOz-RO High density	High density	Vitreous	190		800-10	105	200	620		Orange	White	ı		;	- 2	2.0 5.0	8	-
AP5506	SiOz ZnO PbO High density	High density	Crystalline	170	-	800-10	8	615	705	780	Blue	Bhe	,101×	>800	10~15 <03	L	182	325	
AP5506B	SiOz ZnO PbO High density	High density	Crystalline	170	-	800-10	3	615	705	780	Black	Black	>1013	✝╌	10~15 <03	L	4	305	
AP5578	SiOz.ZnO.RO	High density High breakdown voltage	Crystalline 170	170	1.9	850-10	23	670	785	830	Orange	White	>1012	1	9~14		9,1	325	L
AP5578VE	AP5578VE SiO2-ZnO-RO	Excellent printing, High density High breakdown voltage	Crystalline	190	1.9	850-10	53	670	785	830	Orange	White	>1012	>1000 9~14 <0.2	9~14	<0.2 1.6	8	325	
1	SiO2 - ZnO - RO	High density	Crystalline	170	1.9	850-10	53	679	785	830	Bite	98	70×	880	9~14	<03		325	France
AP5578	SiOz-ZnO-RO	SiOz-ZnO-RO 2004 April version	Crystalline	170	1.9	850-10	S	670	785	830	Rieck	Place	11017	T	11-18 /01	L			

AP Dielec	tric Paste for A	AP Dielectric Paste for Multilayer Hybrid IC																		
	1						Thermal	\vdash	Viscosity Property (DTA)	(DTA)	Color	Ž	ă	Electrical Property	perty	r	٦	Particle Property	2	
ဗီလိ	Glass Type	Paste and Fired	Glass Paste Paste	Paste	Peste	Firing	Expansion Transfor- Softening Crystal-	Transfor-	Softening	Crystal-			Insulation Breakdown	Breakdown		F	Average	Particle Size	Sieving Size	Lead
-		Giass reature	Characteristics Viscosity Specific (Pars) Gravity	Viscosity (Pa-s)	Viscosity Specific (Pa-s) Gravity	Condition (Clmin)	(x10-7/°C)	Coeff. mation	Point 3	Point lization Paste Fired Resistance Voltage	Paste	Pired C	Resistance	Voltage	₩	Que)	Particle (C	tan & Particle (Center Value) Mesh Pass	Mesh Pass	Free or
		High density	٠.				,			2	Ī	Cidas		1	l		(E 7 (E E)	(mar)/nem)		Conto.
AP5700C	AP5700C SiO2-ZnO-RO	High breakdown voltage	Partially	200 2.2	2.2	850-10	٤	099	805	880 Orange White >1018 >1000 9~14 <0.2 1.5	Orange	White	×101×	V 1000	9~14	<0.2	1.5	1	325	Free
AP5701C	AP5701C SiO2-ZnO-RO	High density High breakdown voltage	Partially 190 2.2	190	2.2	850-10	0,	980	802	880	Blue	Blue	Blue >10 ¹² >1000 8~12 <0.2 1.5	200	8~12	<0.2	75.		325	Free
AP5707	SiO2+ZnO+RO		Partially 160	8	2.2	850-10	75	685		96	900 Orange White >10 ¹² >1000 8~12 ~	White	>1012	> 1000	8~12	 	-	2.5	325	Free
												1				1				

	г	_	_	_	Т	_	7
		Lead	Free or			Contd.	
	Į.	Sieving Size	tan & Particle (Center Value) Mesh Pass		325	325	
	Particle Prope	Average Perticle Size Sigving Size	(Center Value)	(D50)(m)	-	4.3	
		Average	Particle	Size (u m)	2.1	•	
			tanô	3	۱ ا		I
	hopenty	-	W		١.	•	
	Electrical Property	Insulation Breakdown	Voltage	3	, 	ļ. —	
		Insulation	Resistance	(a)	<u>'</u>	ļ.	
	Color		Fired	Glass	Green Green	Green Green	
			Paste	_	Green	Green	
	v(DTA)	Expansion Transfor- Softening Crystal-	lization Paste Fired Resistance Voltage	Temp.			
,	Viscosity Property (Softening	Point	၌	550	585	
L	Viscos	Transfor	mation	Point (°C)	460	450	
	Thermal	Expansion	Coeff.	(X10-1/°C)	63	90	
		Firing		("C - min.)	550-5	600-5	
		Paste	Specific	(Pars) Gravity	-	1	
		Glass Paste Paste	Viscosity	(Pa·s)	80	20	
		Glass	Characteristics Viscosity Specific		Vitreous	Vitreous	
AP Overcoat Glass Paste for Hybrid IC (Firing in N ₂)	i.	Paste and Fired	Glass Feature		Excellent waterproofing, Excellent resolution	Excellent waterproofing Excellent burn-out	
oat Glass Paste	1	Glass Type			SiO2-PbO	SiO2-PbO	
AP Overc		နီ ၁			AP5840N SiO2-PbO	AP5841	

AP Dielec	tric Crossover	AP Dielectric Crossover Paste for Hybrid IC (Firing in N.)	n N,)											1		1				
							Thermal	Viscosi	y Property	(DTA)	Colo		Ele	ctrical Pro	erty	\vdash	Parti	cle Property		
နို ပိ	Glass Type	Paste and Fired	Glass Paste Paste	Paste	Pasto	Firing	Expansion Transfor Softaning Crystal-	Transfor	Softening	Crystal			Insulation Breakdown	reakdown	-	_	verage Per	Average Particle Size Sieving Size	ieving Size	Lead
		Glass Feature	Characteristics Viscosity Specific	Viscosity	Specific	Condition	Coeff.	mation	Point	lization	mation Point lization Paste Fired Resistance Voltage	Paris	Tesistance	Voltage		and P	article (Cen	tan & Particle (Center Value) Mesh Pass	Jesh Pass	Free or
				(Pa·s) Gravity	Gravity	(C-min)	(X10-1/2)	(X10-1/°C) Point(°C)	<u>ت</u> ر (2	Temp. (%)	_	Glass	6	3		3	(%) Size("m) (D50)("m)	("")(05		Cont
AP5815C	AP5815C Si02-Ak03-RO	O High density High breakdown voltage	Partially 190 2.0	190	2.0	900-10	83	665	895		Blue	Blue	Blue >101 >1000 7~12 <0.7	V 1000	21~7	6,7	_	2.0	325	Contd.
															-			_	_	

AP Dielectric Paste for Alumina Substrate Glazing of Print Head

•	;					┢	Thermal	Viscosity	Viscosity Property (DTA)	DTA)	Color	<u> </u>		Electrical Property	Ę	-	Particle Pr	poerty		
နို	Glass Type	Paste and Fired	Glass Paste Paste	Paste	Paste	Firing	Expansion Transfor Softening Crystat	Transfor S	Softening	Crystal	-	-	Insulation Breakdown	reakdown	-	A	are Particle Si	Average Particle Size Sieving Size	Thermal	1
		Glass Feature	Characteristics Viscosity Specific	Viscosity	Specific		Cooff.	mation	Point	fization	Paste	Fired	esistance	Voltare	ta:	Darti	cle (Center Val	tan Center Value Mash Pass	Conductivity	F. C.
				(Pars) Gravity	Gravity	("C-min.)	(X10-1/°C) F	int(°C)	<u>-</u>	Temp.(°C) (Q) (V)		Glass	6	3		(m) Size(1 m)	(m) (U20) (m)	(4	(V10°04/vm1500.°F	
AP5710	Si02-Al203-RO	High density Excellent thermal conductivity	Crystalline	170	2.2	Grystalline 170 2.2 900~950-10	79	725	880	915	Orange White >1012	White	>101<	>1000 8~12 <0.2	\ 2 ~	1.1	-	325	3.6	Frae
AP5761D	SiOz-BzO3-RO	AP5761D SiOz-BzOz-RO For overall glaze	Vitreous	170	1.8	170 1.8 1200~1250-30~60	7.1	710	870		Orange	2	21012	1000	Ţ.		5	300		
AP5762D	P5762D Si0z-RO For partial glaze	For partial glaze	Vitreous	170	18	170 18 1200~1250-30~60	47	785	0.05		0 10	100	F. 5	3			2	200	077	6
Characteristics	ics		4			20 20 20 20 20 20 20 20 20 20 20 20 20 2		3	250		DIGG	200	700	1000	-		9.0	325	2.0	92
● By controli	ing crystalline refracti	BBy controlling crystalline refraction, a smooth-surface glaze can be formed, (AP5761D, AP5762D)	wd, (AP5761D, AP	5762D)																

AP Overcoat Glass Paste for Print Head

	,						Thermal	Viscosity	Viscosity Property (DTA	(DTA)	Color	-	Elec	Electrical Property	Ť	L	Particle Property	erty		
ခိုင် ၁	Glass Type	Paste and Fired	Glass	Pasto	Paste	Firing	Expansion [Transfor Softening		Crystal-			Insulation Breakdown	eskdown	-	Average	Average Particle Size	Sieving Size	Thermal	7
		Glass Feature	Characteristics Viscosity Specific	Viscosity	Specific	Condition		mation		lization	Paste	Fired	Resistance	Voltage	E tan &		Center Value		Conductivity	Free
				긺	Gravity	(C-min.)	ତ	Point (°C)		Temp. (°C)		Glass	Ĝ	_ S	£	6) Size(u m)	m) (D20) (mm)		(X10°cal/cm.sec. C) Contd	Contd
AP5317	SiO2 - B2O3 - RO		Vitreous	8	-	850-10	55	280	720		Grav	Gray	-	-	-	_	-	325	200 100 100	
AP5347	PbO-Br03-Si02		Vitreous	120	2.4	810-10	۶	475	590		White	Clear			'	7		325		
AP5348	PbO-B203-SiO2	Excellent surface flatness High breakdown yoltage	Vitreous	100	2.4	810-10	62	460	909		Gray	Black	>1012	> 2000	'	ļ	5	325	5.0	Conta
AP5349	PbO-8203-SiO2	Excellent surface flatness High breakdown voltage	Vitreous	100	24	810-10	62	460	809		Gray	Gray	>1012	>2000	'	-	5	325	5.0	Contd
AP5352B	PbO-B2O3-SiO2	Excellent light blocking	Vitreous	8	2.4	810-10	65	460	580	T	Black	Black		,				105		3
AP5584	SiO2-B2O3-PbO		Vitreous	30	1.9	790-10	45	485	710	-	White	Clear	, 10 ×	0001 ×	8~13 <02	2 17	,	325	3.1	9
AP5588	SiOz-PbO		Vitreous	20	2.2	830-10	57	570	07.7		White	Clear	Ė	+	8~13 <0.2		1.5	325	33	Contra
AP5564F	SiO2 - B2O3 - PbO	$\overline{}$	Vitreous	2	2.1	810-10	21	515	680		White	Clear	>101	> 1000	8~13 <0.2	0.8		325	3.4	Į.
AP5585F2	SiOz-PbO	Excellent surface flatness	Vitreous	۶	2.4	830-10	28	535	745		White	Clear	>101	⊢	8~13 <0.2	.2 0.7	,	325	3.5	Cont
AP5568	SiO2-PbO	Excellent resistance to wear	Vitreous	8	2.4	830-10	28	560	760	-	White	Clear	71017	>1000 8	8~13 <0.2		1.2	325	4.0	5
AP5717	SiOz · ZnO · RO	For AIN coat	Crystalline	120	-	850-10	35	099	795	840	White	White	-	- -	\		2.5	325		Į.
APOS	SO2-8203-RO	High breakdown voltage	Vitreous	8	•	810-10	55	580	720		Gray	Gray	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	> 1500		-	1.5	325	3.6	8
APOSTS	S/O2-82O3-KO	Excellent surface flatness	Vitreous	8	-	810-10	55	280	720		Gray	Gray	-	> 1500		-	1.5	325	3.0	و
Developing Products	Products																			
5316A	SiO2-B2O3-RO	Excellent surface flatness High breakdown voltage	Vitreous	8		810-10	55	580	720	-	Gray	Gray	<u>^</u>	> 2000	- - -	-	1.5	325	5.0	F.
Characteristics	tics											-								
Outstandin	ig surface flatness, resi	Outstanding surface flatness, resistance to wear, and heat resistance make them ideal as over coats for various kinds of print heads, including heaters, image sensors and thermal heads.	ske them ideal as c	over coats !	for various ki	nds of print heads, in	cluding heaters	9, image sensc	ors and them	nel heads.										
● AP5347.AF	95348 and AP5349 are	AP5347.AP5348 and AP5349 are for heaters, AP5352B is for image sensors, and AP5560 and AP5580 series are for thermal heads.	ors, and AP5560 a	and AP5580	sories are fo	r thermal heads.	,	•												
4:AP5317 am	od AP5717 are for AIN	:: AP5317 and AP5717 are for AIN coat. (AP5317 : Top layer, AP5717 : Bottom layer)	ttom layer)																	•

AP Primary Coat Glass Paste for Chip Resistor

		_										l								
•	_							Viscosity Property (DIA)	/ Property	UIA)	Color	Ŀ	Ŭ	etrical Prop	ş	_	Partic	e Property		
နို ပိ	Glass Type	Paste and Fired	Glass Paste Paste	Paste	Paste	Firing	Expansion	Expansion Transfor Softening Crystal-	Softening	Crystal-			Insulation	Insulation Breakdown	┝	Aver	age Partic	Average Particle Size Staving Size	vine Size	Lead
		Glass Feature	Characteristics Viscosity Specific	Viscosity	Specific		Coeff.	mation	Point	lization	Paste	Fired	Paste Fired Resistance Voltage	Voltage	<u>ج</u> پ	n & Parti	ole (Cente	tan & Particle (Center Value) Mash Pass	th Page	Free or
				(Pa·s) Gravity	Gravity	("C-min.)	(X10-7/°C)	(X10-7/°C) Point (°C)	(°C) Temp.(°C)	(C)		Glass	6	Έ	_	Disp.	(L) (DEO) ((17)	!	
		Eventual and Assessed - Assessed													1			// 14 111/		Conto.
AP5231	SiO2.PbO	and stability of resistance	Vitreous 160	8	2.5	600-10	73	480	009		Green	Green	Green Green >1010 >500	> 200	_	- 20	_		325	Contd.
														1	1	1				
V 0 V	7	AD Control On the Class But for Other Day																		
71 080	ond Coat Glass	Paste for Unip Resistor																		

							Therma	Ĺ	iscosity Property	rtv (DTA)		Color		Flactrical Dennarty	tion.	$\frac{1}{2}$		Bartiala Brana		
ć			•					l						10000				מסום ביוסחם		
9	Cines Iype	Paste and Fired	21288	Glass Paste Paste	Paste		Expansion		Transfor Softening	ng Crystal-	_		Insulation	Insulation Breakdown		٧	Verse P.	Average Particle Size Sieving Size	Sinving Size	700
		Glass Feature	Characteristics Viscosity Specific	Viscosity	Specific	ŝ	Coeff.	mation	Point		lization Paste	Fired	Fired Resistance Voltage	Voltage	4	P D Le	orticle (C	tan Berticle (Center Vehie) Mesh Pass	Mach Pass	Free or
				(Pa·s) Gravity	Gravity	(°C-min.)	(X10-1/°C)	X10-'/°C) Point (°C)	(C)	Temp.(C)	ठ	Glass	6	3		(%)	Size(um)	(D50)(um)		5 60
AP5215A	SiO2-B203-Pb0	SiO2+B2O3+PbO Excellent acid-proof characteristics Vitreous	Vitreous	300	1	600-5~10	99	470	575	L	White	Clear		 -	ļ.	-	1	1	325	Surfa
AP5215B	SiO2 - B2O3 - PbO	NP5215B SiOz B203 - PbO Excellent acid-proof characteristics	Vitreous	100	-	600-5~10	99	470	575		Black	╀	21010	V 500					200	Colling
		Excellent acid-proof characteristics	_									+				1			250	Conta.
AP5216B	AP5216B Si02-Pb0-B203	Excellent surface flatness	Vitreous	210	ŀ	590-5~10	99	475	575		Black	Black	, ot <	200	,	,	,	2.5	325	Conto
AP5236	SiOz-PbO	AP5236 SiO2-PbO Excellent acid-proof characteristics	Vitracus	170	,	600-5~10	75	ARE	9				900	202	1	+				
						200	,		200		Green	Graen		2000	<u>'</u>	-	_	1	325	Contd.
: : : :																				
AP Markir	ו Glass Paste פ	NP Marking Glass Paste for Chip Resistor																		

	Lead Free or	Contd	Contd.
÷	Sieving Size Mesh Pass	325	325
Particle Prope	Average Particle Size Sieving Size tan & Particle (Center Value) Mesh Pass	(m tr) (nen)	1.7
	Average Particle	1.2	'
	tand	<u> </u>	١
Sert.	ພ	ŀ	,
ectrical Pro	Breakdown Voltage		'
	Insulation Resistance	,	,
lor	Fired	White	White
ပိ	Paste	White	White
(DTA)	(g Crystal- lization Temn (°C)	2	
y Property	Softenir Point	485	575
Viscosit	Transfor— (mation Point (°C.)	400	470
Thermal	Expansion Transfor- Coeff. mation (X10 ⁻⁷ /°C) Point (°C)	72	2
		510-5	590-5~10
	y Specific Gravity		1
	Glass Paste Paste racteristics Viscosity Specific (Pass) Gravity	5	150
	Glass Paste Characteristics Viscosity (Pa·s)	Vitreous	Vitreous
	Paste and Fired Glass Feature	Excellent resolution	Excellent resolution Excellent sold proof characteristics
	Giass Type	SiO2-PbO-B2O3	SiO2-PbO
	800	AP5346WW	AP5216W

Glass Powder & Paste & Green-sheet for PDP

Sealing Glass Powder for Glass Panel, PD200 or AS (Soda Lime)

Code	ASF1304M	ASF1304Z	ASF1200M	ASF1200A	IWF2300M	DT430-150
Glass Characteristics	Crys	talline	Vitr	eous	Vitu	eous
Glass Type	B2O3 · P	bO·ZnO	B ₂ O ₃	•РьО		2O3-PbO
Thermal Expansion Coeff. (×10 ⁻⁷ /°C)*1	83	88	72	73	67	72
DTA Transformation Point (°C)	320	320	320	320	307	310
DTA Softening Point (°C)	400	400	390	380	353*5	360°5
DTA Crystallization Temp. (°C)	515	515	-	-	-	
Flow Button Diameter (mm φ)* ¹	-		21	21		
Color	Black	Black	Black	Black	Black	Black
Substrate Strain after Sealing (kg/cm2)*3	−50~+50	-50~+50	-50~+50	-50~+50		
Specific Gravity	6.1	6.1	5.8	5.8	7.2	7.2
Average Particle Size (μ m) 4	4.0	4.0	5.0	5.0		
Sieving Size (Mesh Pass)	150	150	150	150	-	
Firing Condition (*C-min.)	450-30	450-30	450-10	450-10	430-10	430-10
Usage_	PD200	AS	PD200	AS	PD200	AS

*1:50~300°C/crystalline types, 50~250°C/vitreous type

*2:Fired at 450°C-10min. For vitreous, 450°C-30min. For crystalline, 12.8mm diam. Pre-pressed glass with the same specific gravity value *3: "+":Frit compression, "-":Frit extension *4:Air-permeability method

*5: Third inflection point on DTA curve

2004.April version

Dielectric Paste (Clear) for Front Panel, PD200

Code	YPT340	YPT065F
Glass Type	PbO+B2O3+SiO2	PbO·B2O3·SiO2
Color (After Firing)	Clear	Clear
Thermal Expansion Coeff. (×10 ⁻⁷ /°C)*1	75	74
DTA Transformation Point (°C)	490	460
DTA Softening Point (°C)	585	560
Paste Viscosity(Pa·S)*2	100~180	100~180
Firing Condition (°C -min.)	580-30	580-30
Usage	Sintered	Sintered

*1:Temperature range 50~350°C

*2:Brookfield rotary viscometer, 10rpm, 25°C

Rib Paste for PD200

Code	RPW401	RPW032
Glass Type	PbO·B2O3·SiO2	PbO+B2O3+SiO2
Color (After Firing)	White	White
Thermal Expansion Coeff. (×10 ⁻⁷ /°C)*1	73	73
DTA Transformation Point (°C)*3	460	450
DTA Softening Point (°C)*1	560	550
Paste Viscosity (Pa·S) *2	40~100	40~100
Firing Condition (°C — min.)	550~570-10	530~550-10
Usage	High Dense	High Dense

*1 : Temperature range 50~350°C

*2: Brookfield rotary viscometer, 10rpm, 25°C

*3: Glass powder only

Dielectric Paste for Rear Panel, PD200

Code	AP5670
Glass Type	PbO+B2O3+SiO2
Color (After Firing)	White
Thermal Expansion Coeff. (×10 ⁻⁷ /°C)*1	72
DTA Transformation Point (°C)	450
DTA Softening Point (°C)	560
Paste Viscosity (Pa·S)*2	100~180
Firing Condition (°C-min.)	560~570-10
Usage	For Under Rib

*1:Temperature range 50~350°C

*2:Brookfield rotary viscometer, 10rpm, 25°C

Dielectric Green Sheets for Rear Panel, PD200

Code	AGS7001
Glass Type	PbO-B2O3-SiO2
Color (After Firing)	White
Thermal Expansion Coeff. (×10 ⁻⁷ /°C)*1	72
DTA Transformation Point (°C)	450
DTA Softening Point (°C)	560
Firing Condition (°C-min.)	560~580-30
Usage	For Under Rib

*1:Temperature range 50~350°C

Dielectric Paste for Black Stripe

Biolocalo i asto for Black Surpe	
Code	AP5695(BMP065)
Glass Type	PbO+B2O3+SiO2
Color (After Firing)	Black
Thermal Expansion Coeff. (×10 ⁻⁷ /°C)*1	90
DTA Transformation Point (°C)	455
Paste Viscosity (Pa·S) *2	70~130
Firing Condition (°C - min.)	580-30

*1:Temperature range 50~350°C

*2: Brookfield rotary viscometer, 10rpm, 25°C

AS Tube for Exhaustion

Item	AS Tube
Thermal Expansion Coeff. (×10 ⁻⁷ /°C)*1	87
Tube OD (mm ϕ)	5
ID (mm φ)	3

*1:Temperature range 50~350°C